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RUSSIAN MINE EXPLOSIVE, DESCRIPTION OF CASE, ANCHOR AND COMPONENTS

28 April 1952

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U. S. NAVAL ORDNANCE LABORATORY
WHITE OAK, MARYLAND

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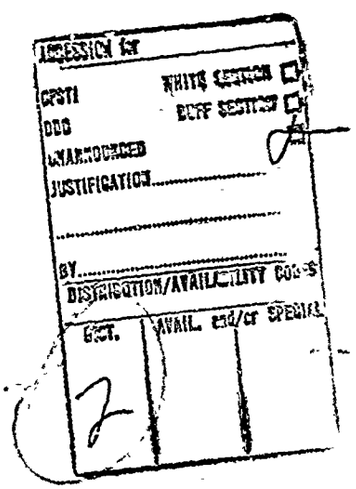

(18) NAVORD Report 2827 (19)

(6) RUSSIAN MINE RMYaM, DESCRIPTION OF CASE, ANCHOR AND COMPONENTS,

Prepared by:

(10) G. H. Davidson

RMYaM

ABSTRACT: This report presents a description and analysis of one assembled Russian type RMYaM Mine which was recovered in Wonsan Harbor, Korea in March of 1952 and later shipped to the Naval Ordnance Laboratory for evaluation and field trials. Studies of this ordnance indicate that the mine case and anchor are small, compact, well constructed and of elementary principle of operation. The mine is essentially a moored, contact device which is laid by surface craft. It uses Hora type chemical horns for detonation and a convential Russian type hydrostat for safety before planting and for delayed arming. A plummet depth setting device is used to preset mine depths. The mine carries a payload of 44 lbs. of TNT and is evidently intended for use against small craft.

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U. S. NAVAL ORDNANCE LABORATORY
WHITE OAK, MARYLAND

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NAVORD Report 2427 28 April 1952

1. NAVORD Report 2427 presents a description of a Russian Mine which was recovered in Korea and forwarded to the Naval Ordnance Laboratory for evaluation.

2. The initial analysis was performed under Bureau of Ordnance Task NOL-Re6b-311-1(T10)-52. The information obtained is for the use of the Bureau of Ordnance and associated activities.

3. The subject matter presented herein represents the views of the Naval Ordnance Laboratory.

W. C. SCHINDLER
Rear Admiral, USN
Commander

R. E. Hightower

R. E. HIGHTOWER
By direction

CONTENTS

ILLUSTRATIONS

REFERENCES

(a) COMNAVFE ser ltr 18-S-52 of 29 Mar 1952 - subj: Russian RaYaM Mines and Mine Markings (NOL File NP/NOL/EF61(169)

(b) COMINRON 3 ser ltr X17 ser 004 of 31 Mar 1952 - subj: New type Russian Mines, recovery of (NOL File NP/NOL/EF61(170)

(c) S Report C-37252 Notes on Russian Type Mines by U. S. Mine Warfare Mission

(d) S Report 37488 ONI Intelligence Report Titled ANTI-SUBMARINE WARFARE AND AMPHIBIOUS DEFENSE WEAPONS OF THE USSR

RUSSIAN MINE RMYaM, DESCRIPTION OF CASE, ANCHOR AND COMPONENTS

HISTORY

1. At the request of the Bureau of Ordnance the Naval Ordnance Laboratory undertook the task of making a preliminary analysis of a new type Russian mine which was designated as type RMYaM by COMNAVFE. Reference (a) contains a description of the Russian RMYaM Mines and Mine Markings. Reference (b) reports the recovery of three of the new Russian mines in Wonsan Harbor, Korea in March of 1952 by LT R. S. Edwards, USNR and CWO Joseph S. Karneka, USN.

2. One of the three mines and an anchor was shipped to EODU Indianhead, Maryland where TNT was removed from mine case. The assembled unit was later shipped to the Naval Ordnance Laboratory for inspection.

INTRODUCTION

3. The Mine RMYaM is a small surface craft laid moored contact mine with three Hertz type chemical horns for actuation. It is designed for use against small craft and can be planted in a depth of water of 165 feet or less. The maximum depth of case is approximately 9 feet. The weights and dimensions are listed in Table I.

TABLE I

Approximate Weights and Dimensions of Mine RMYaM

CASE (Prolate Spheroid)

Least Diameter	21 in.
Maximum Length	22.8 in.
Case Empty	93 lbs.
Explosive Charge (TNT)	44 lbs.
Assembled Mine	115± 5 lbs.
Buoyancy in Sea Water	235 lbs.
Positive Buoyancy (loaded)	120 lbs.

ANCHOR (Cylinder Closed at one end)

Diameter	21 in.
Height	16 in.
Truck height	4 in.
Total height	20 in.
Wheel Diameter (4)	4.75 in.
Gage	20 in.

Wheel Tread	2 in.
Maximum Height (Assembled Mine and Anchor	40 in.
Mooring cable diameter	.375 in.
Mooring cable length	170 ± 5 ft.
Anchor Assembly weight in air	222 ± 5 lbs.

Safety Device

4. The mine is equipped with a hydrostatic device with a soluble plug which prevents closure of the detonator circuit on board ship. The hydrostat battery contacts are short-circuited until the soluble plug has dissolved and hydrostatic pressure operates to disconnect the shorting strip and connect the horn batteries to the detonator. No booster or detonator extender is used in this mine. The booster and detonator are an integral part which is held in the booster cavity with a steel clamp.

Operation During Planting

5. The following discussion is obtained from information given in references (a), (b), (c), and (d) and from inspection of the mine and components. The mine is installed on board ship in runway tracks or on deck fully assembled as shown on Figure 1 and laid from the stern. Either a manually operated lanyard or a shearing pin allows the mine anchor plummet to fall freely from its rack. The mine and anchor float in water until the plummet delay cord unreels from the plummet delay mechanism and the plummet operates a release mechanism which allows the mine and anchor to separate. The mooring cable drum does not turn until the anchor and case have parted sufficiently to put a strain on the drum; at this time the plummet is almost fully unwound. There is a holdoff mechanism on the mooring drum shaft. This mechanism is set at three turns; therefore, when the drum has turned three revolutions the pawl is free to lock the drum except for the strain on the pawl by the plummet cord. The plummet has fully unwound by this time, i.e. before the hold-off mechanism has reset.

6. The plummet and anchor sink down until the plummet touches the ground and the pawl locks the drum pulling the mine under the surface a distance approximately equal to the length of the plummet cord. When the mooring drum is locked, two helical springs attached to a mooring cable eye and bottom of anchor case absorb the shock. Attached to the bottom of the anchor is a spade with two triangular points which enter the bottom to prevent walking of the mine and anchor. This spade is shown on Figure 6.

7. The mine arms when the soluble washer in the hydrostat dissolves and the hydrostat is two or more feet below the water surface.

8. The case contains a blank plug and this may be used by the Soviets to install a sterilizer or flooding device in the mine case.

DESCRIPTION OF COMPONENTS

Case

9. Figure 2 is a top view of the RMVaM case which is a prolate spheroid of mild steel 0.1 in. thick in two welded sections. One flange, 7 inches in diameter with a 6 inch diameter threaded opening, is welded in the top center portion of the case. This houses the hydrostat.

10. Three flanges, 3.5 inches diameter with 1.5 inches diameter threaded holes, are equally spaced on a circle 8 inches from the top center-line. The chemical horns are mounted in these openings.

11. One flange, 3.5 inches diameter with 1.5 inches diameter threaded hole, is located 11.5 inches from top center point of case. This contained a blank plug.

12. Two U-shaped lifting eyes of .5 inch bar stock are welded to the case 180 degrees apart and 12 inches from top of case. The anchor securing lugs are .375 inches thick. One is welded to a case 2 inches below the horizontal center-line of the case, and the second is welded to the case 5.5 inches from the horizontal center-line of the case. This is shown on Figure 8.

13. The mooring pad eye is of steel 1.5" x 2" X 0.75" with a 0.875" diameter hole and is welded to the bottom of the case as shown on Figure 3. A mooring shackle and swivel of 0.375" steel connects the mooring cable to the case.

14. A felt gasket, which is not shown, is glued to the lower periphery of case to provide a seal between the case and the anchor during planting.

15. The location of the booster well and charge compartment is shown on Figures 2, 3, and 8. Figure 3 shows the location of the charge filler hole which is 5 inches from the bottom part of the case.

Anchor

16. The operation of the anchor is very similar to U. S. Mine Mk 6 with plummet depth setting device and gear wheel release mechanism. The anchor itself consists of a 21 inch diameter steel drum welded to a steel 4-wheel truck as shown on Figure 5. Figure 6 shows the assembled mooring drum, cable outlet, dashpot, plummet, plummet cord and hold-off mechanism.

17. The plummet is a pear shaped object of steel with a recess for holding a steel rope. Evidently a predetermined amount of plummet wire is wound in the recess on the plummet. The plummet or spool lays in a tray and is kept in place by a small copper wire.

18. This spool falls out as soon as mine and anchor is launched. However, the wire and anchor do not separate until the mechanical dashpot releases a two foot length of wire which is attached to an eye on top of the plummet and wound on a shaft in the dashpot. The dashpot shaft is keyed to a clock gear as shown on Figure 7 which turns against a rocker arm brake. As the plummet falls it turns the shaft on the dashpot and unwinds the short wire rope. When this rope unwinds completely the plummet falls freely for about three feet and operates a release mechanism which allows the mine and anchor to separate.

19. The mooring cable drum does not turn until the anchor and case have parted sufficiently to put a strain on the drum; by this time the plummet is almost fully unwound. There is a hold-off mechanism on the mooring drum shaft. This mechanism is set at three turns, therefore, when the drum has turned three revolutions the pawl is free to lock the drum except for the strain on the pawl by the plummet cord. The plummet has fully unwound by this time; i.e. before hold-off mechanism has reset. The plummet and anchor sink down until the plummet touches the ground and the pawl locks the drum, pulling the mine under the surface the distance of the length of the plummet cord. When the mooring drum is locked, two heavy springs attached to a mooring cable eye and bottom of anchor case, absorb the shock. Attached to bottom of anchor is a spade with two triangular points which enter the bottom to prevent walking of mine and anchor.

Hydrostat

20. The hydrostat is shown on Figure 2 and contains a space for a soluble plug and holes through external housing for water entry to the top of the rubber diaphragm. There are four terminals on the hydrostat which are colored red, white, blue, and green. After the soluble plug has dissolved, hydrostatic pressure operates to disconnect the red and white terminals and to connect the red and blue, and white and green terminals. The leads from firing horns are connected to the red and white terminals which short-circuit batteries in case of accidental breakage of electrolyte before planting. The detonator leads are connected to the blue and green terminals.

21. The firing device employed by the mine consists of three chemical horns. Each horn is an ordinary Hertz type horn consisting essentially of a carbon anode, a zinc cathode, and a sulfuric acid and potassium dichromate electrolyte, imparting about 1.9 volts when actuated. The battery is activated when the vial containing the electrolyte is fractured within the lead horn. The horns which fit the MKB glands also fit the RMYaM glands but the lead part of the horn used in connection with the MKB is thicker as the MKB is designed for use against larger ships.

22. The detonator is of standard Soviet design and is an integral part of the booster which is smaller than that used in the MKB. The booster is 1.5 inches long and 1.25 inches in diameter. The overall length with plastic cover is 8.25 inches.

SUMMARY

23. The Russian Mine RM-1 is small, compact, well constructed, and simple in operation. Standard mine designs of German and Soviet origin are used. The mine is essentially a moored, contact device which is laid by surface craft. It uses Hertz type chemical horns for detonation and a conventional Russian type hydrostat for safety before planting and for delayed arming. A plummet depth setting device is used to preset mine depths. The mine carries a payload of 44 lbs. of TNT and is evidently intended for use against small craft.

Herz Type Chemicall Horns

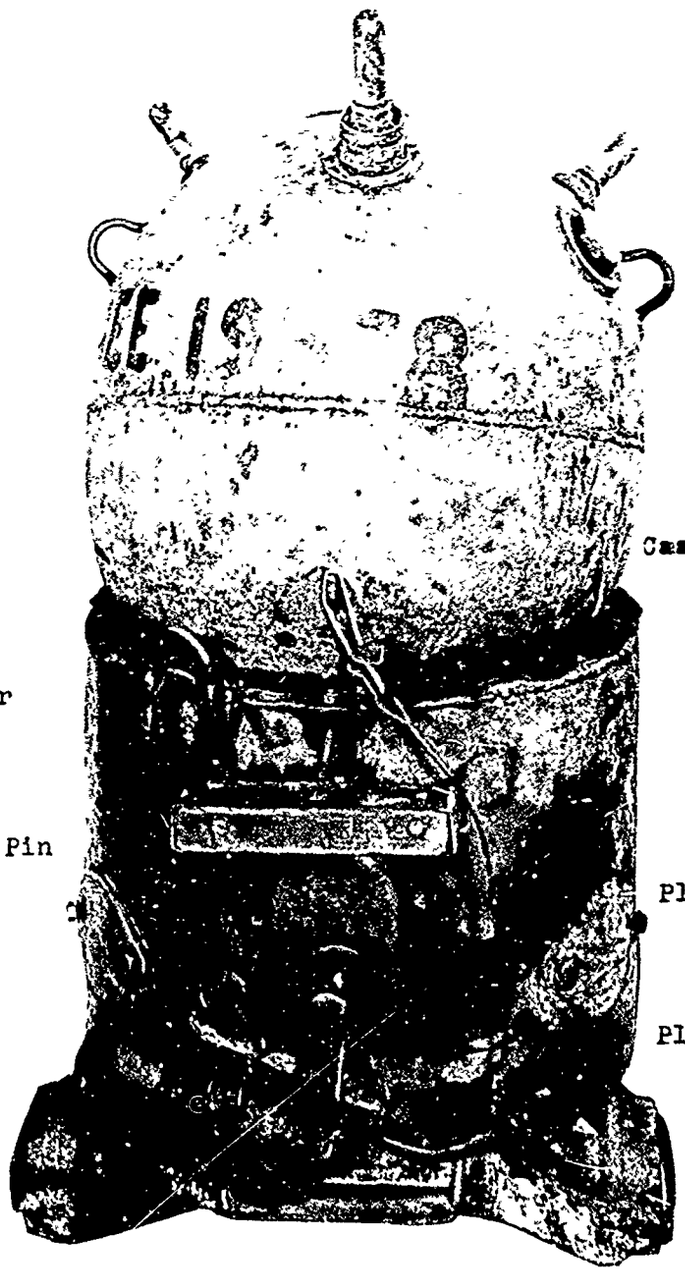


FIG 1 RUSSIAN MINE R-MY-M

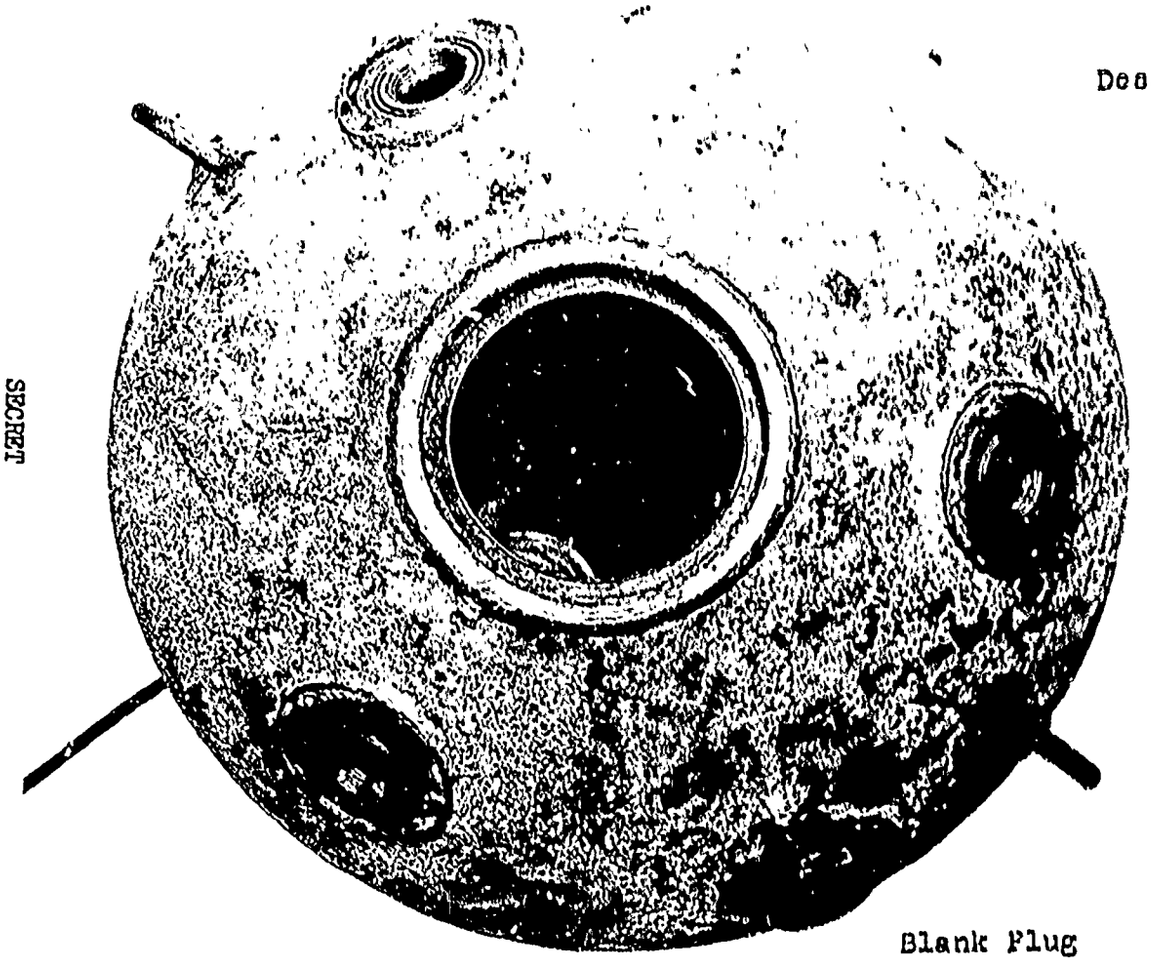


FIG 2 RUSSIAN MINE CASE RMYaM TOP VIEW

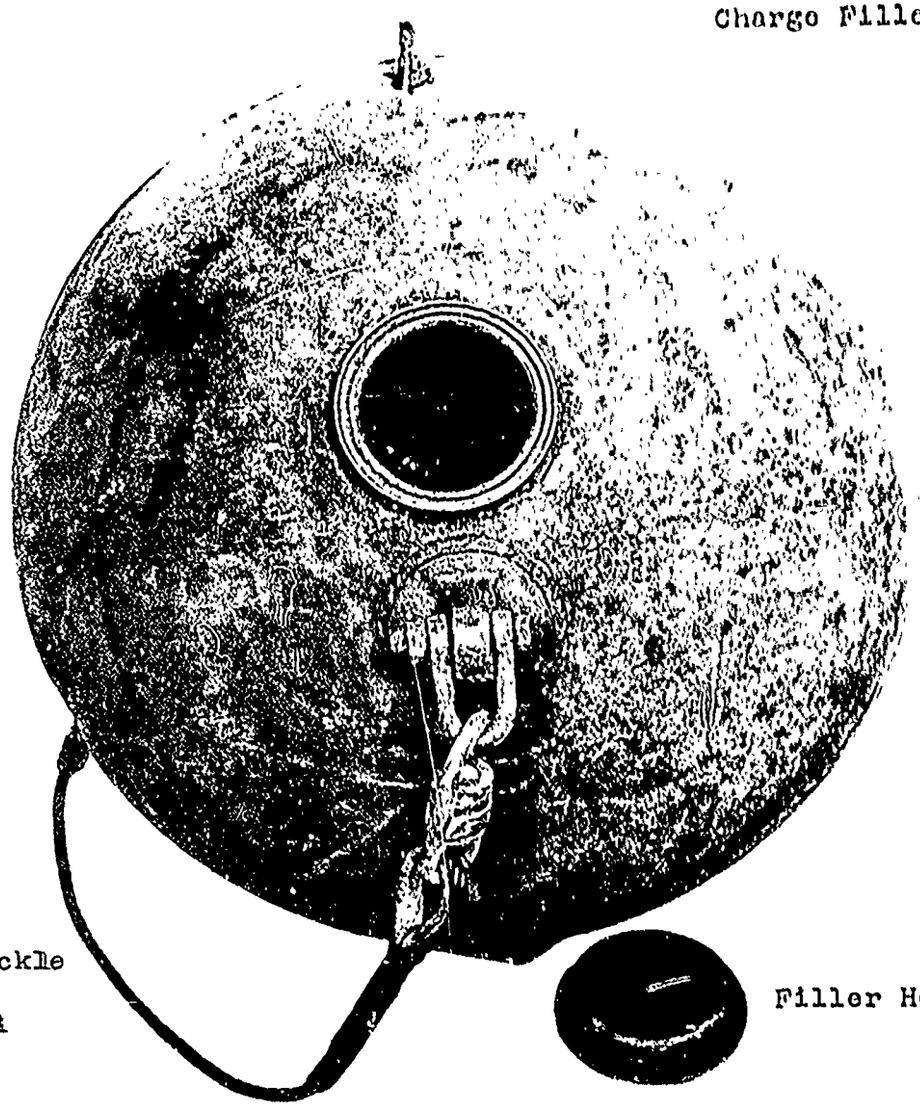


FIG 3 RUSSIAN MINE CASE RMYaM BOTTOM VIEW

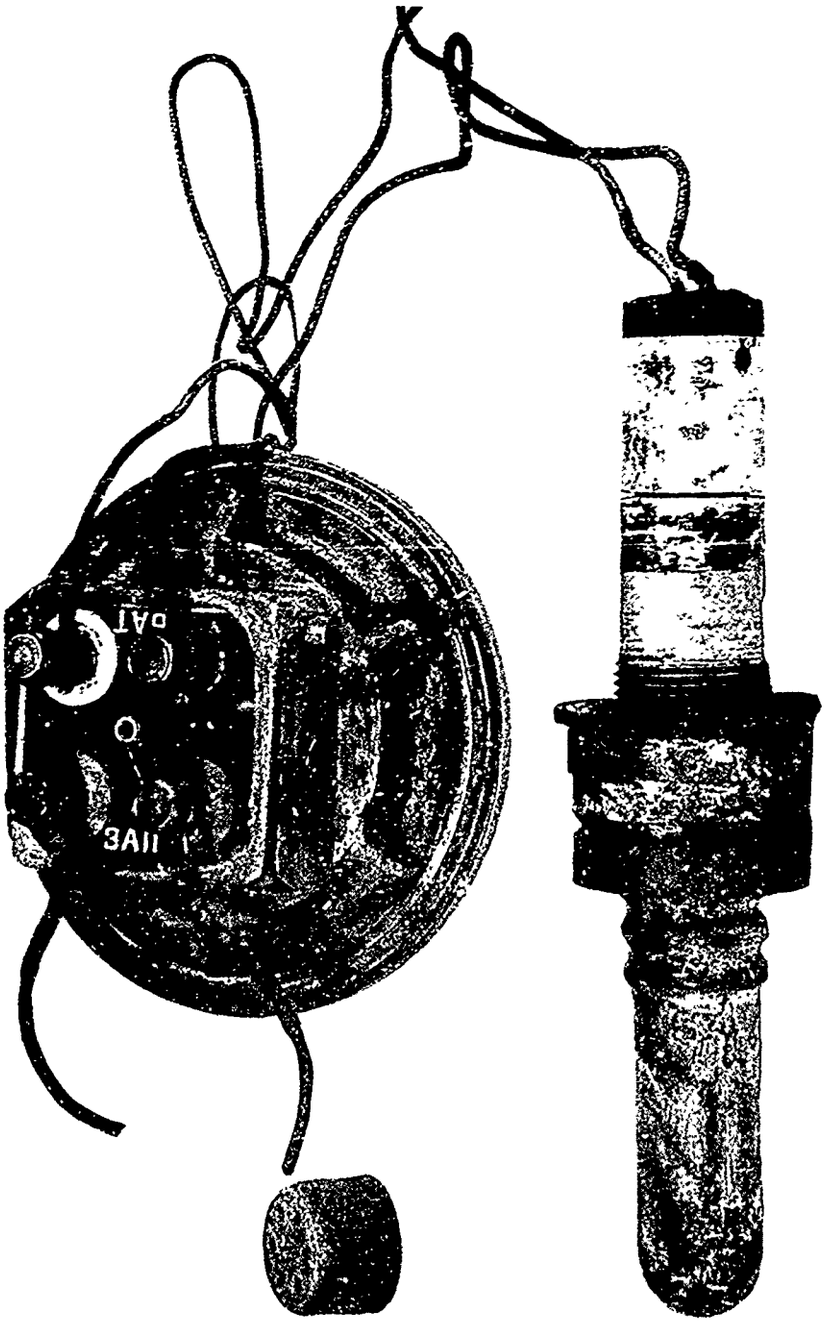


FIG 4 HYDROSTAT AND HERZ TYPE CHEMICAL HORN

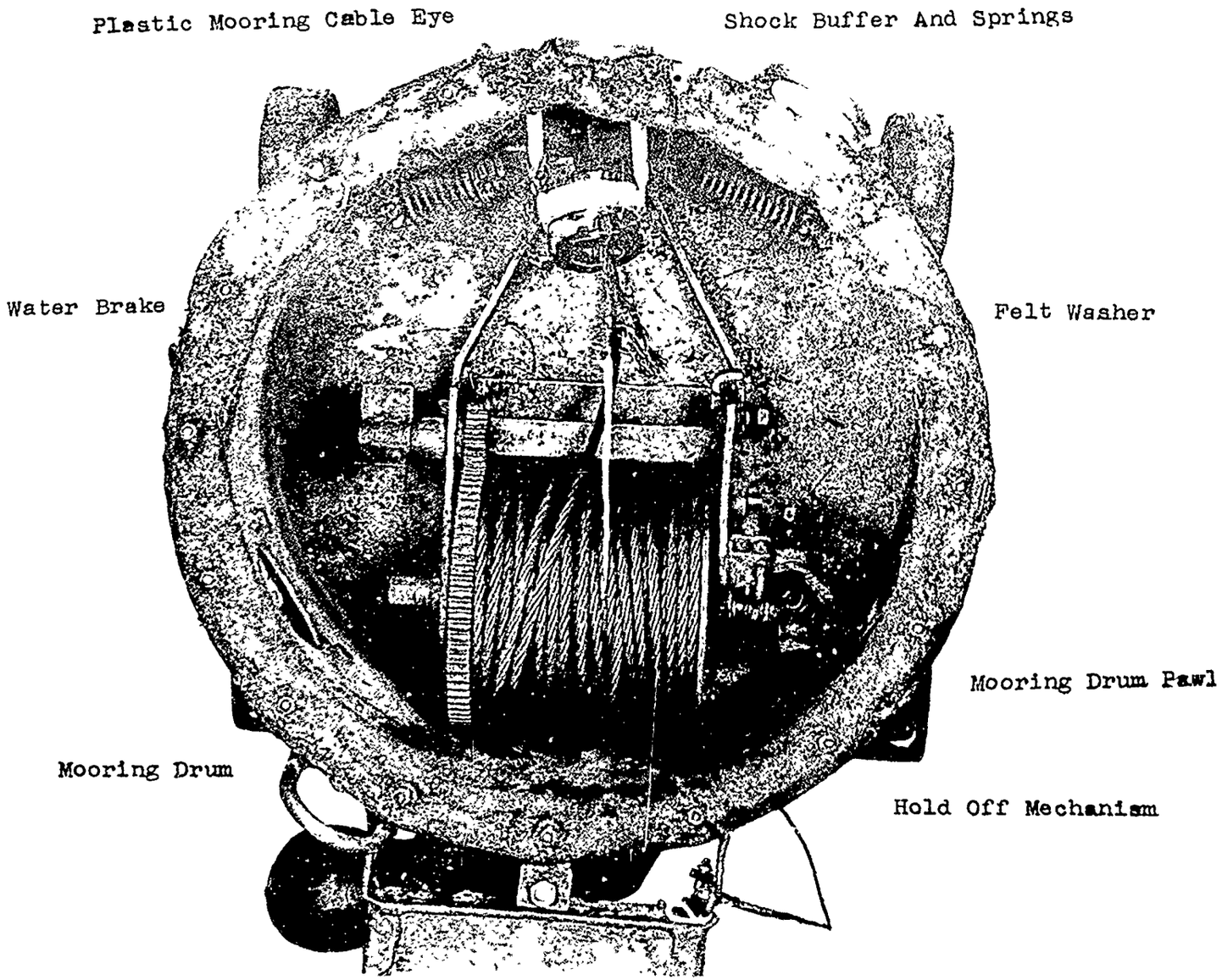


FIG 5 RUSSIAN MINE RMYaM ANCHOR TOP VIEW

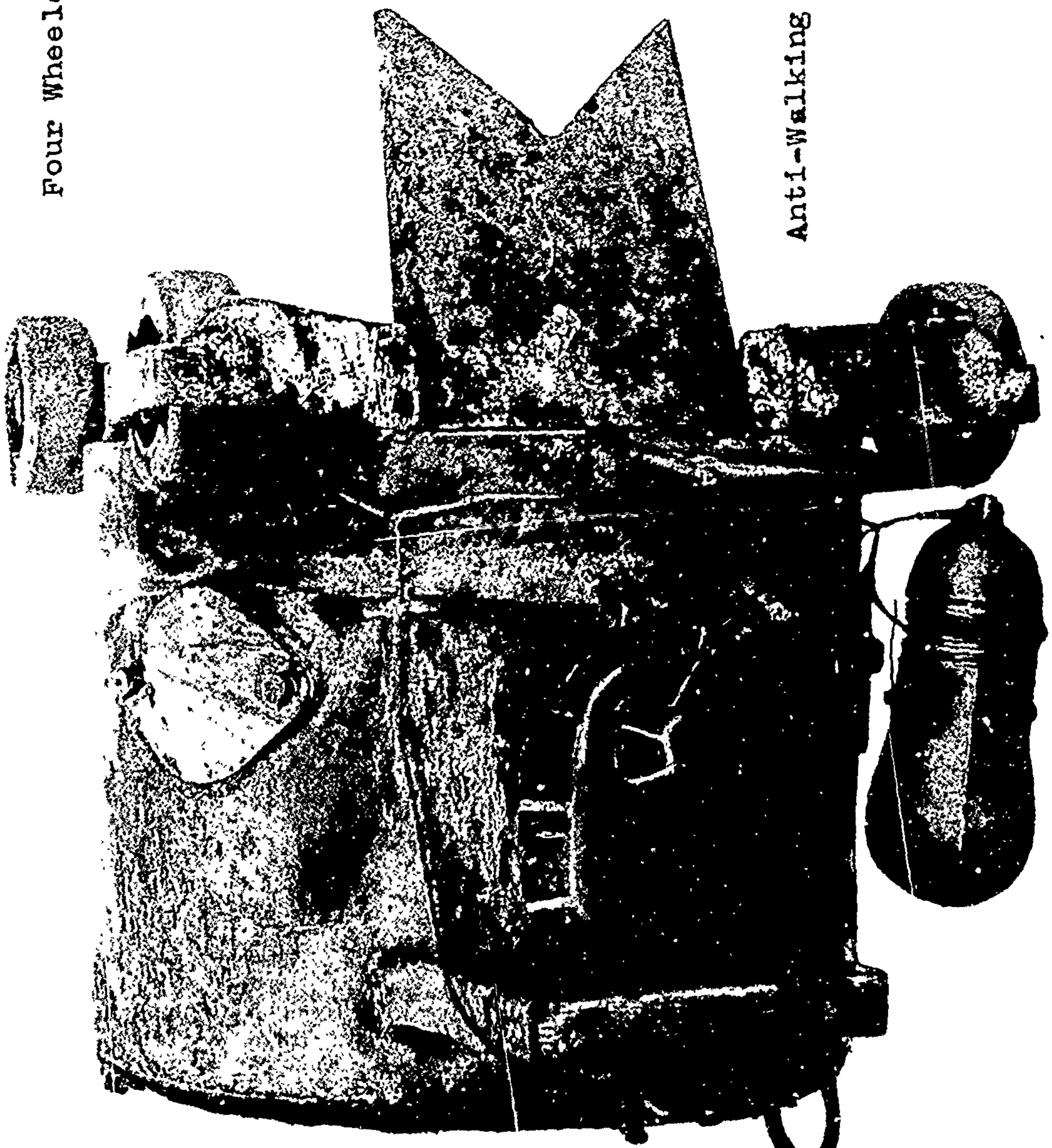


FIG 6 RUSSIAN MINE RMYaM ANCHOR SIDE VIEW

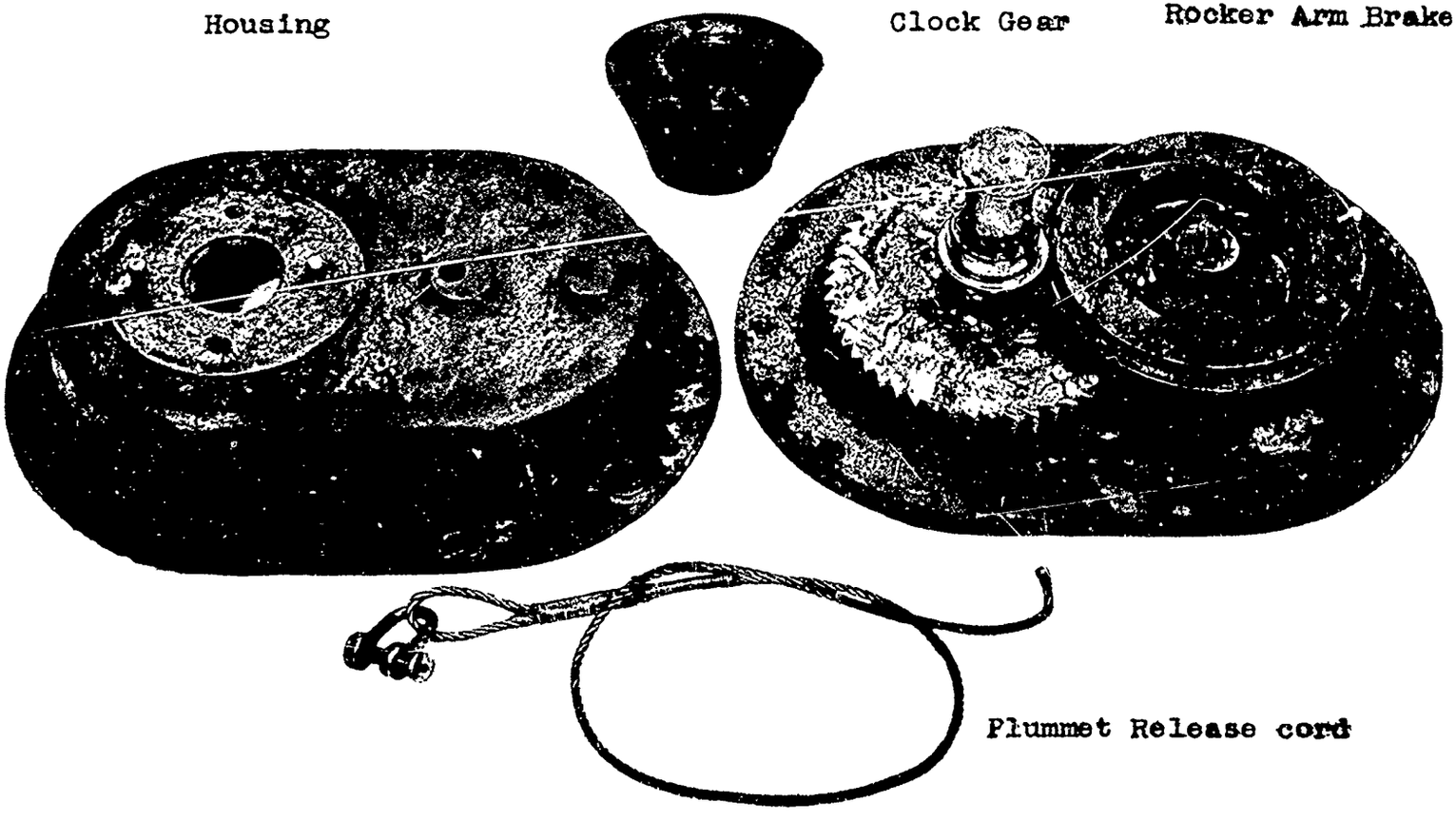
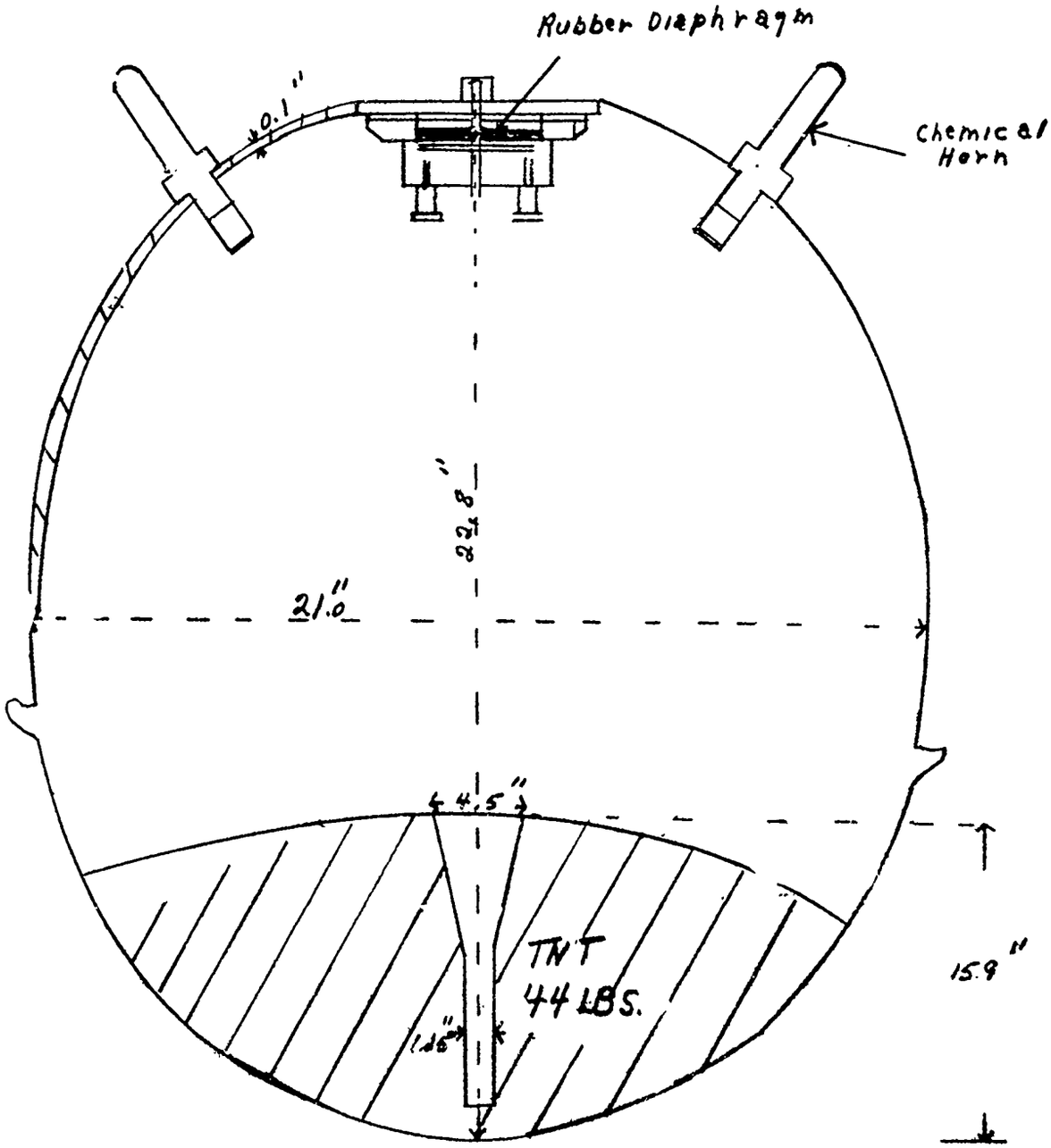
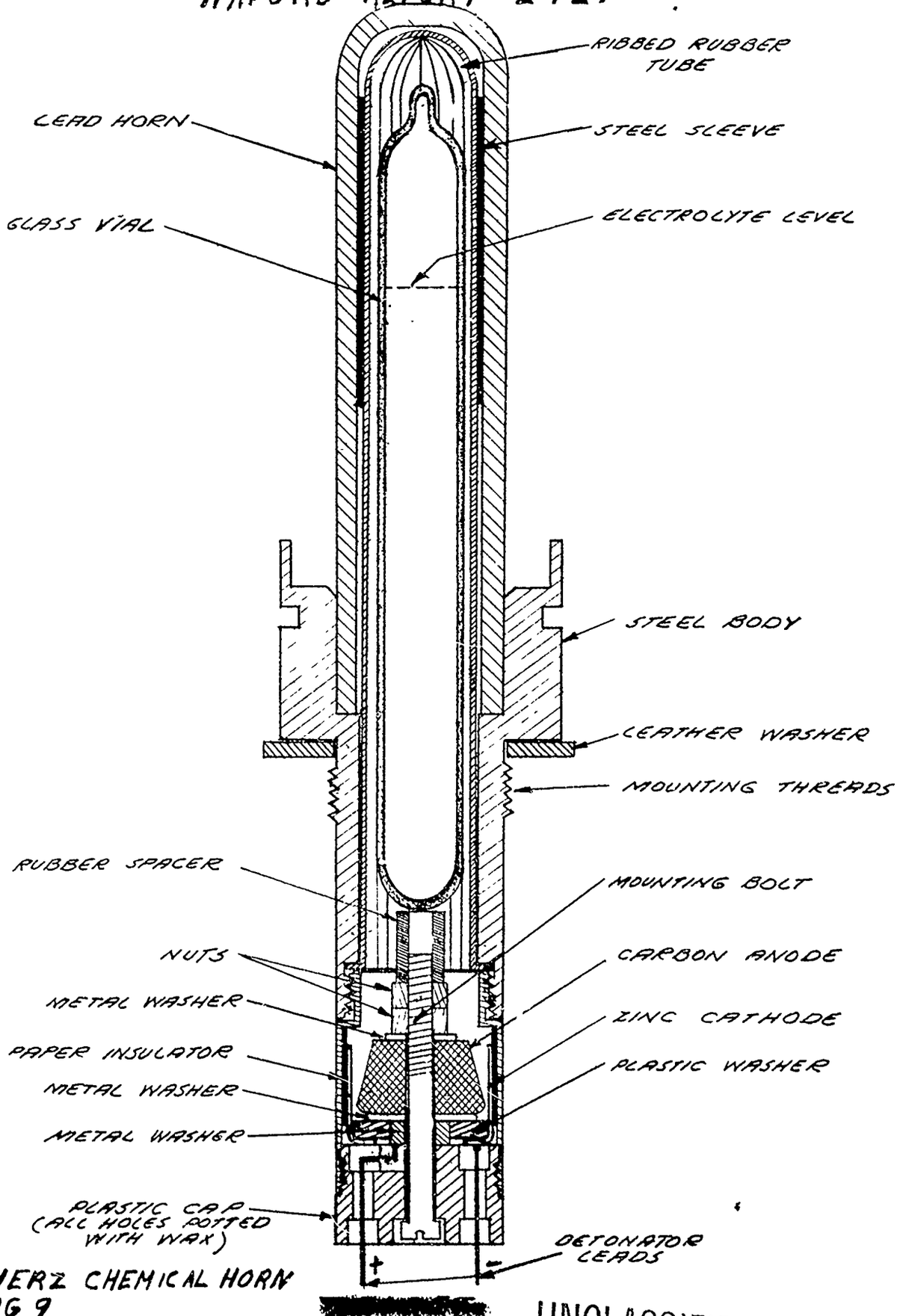


FIG 7 RUSSIAN MINE RMYaM PLUMMET RELEASE MECHANISM



DRAWING OF MINE R-MY2M
FIG 8.



HERZ CHEMICAL HORN
FIG 9